AMERICAN WHITE PELICAN (*Pelecanus erythrorhynchos*)

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Criteria Scores

Population Trend	Range Trend	Population Size	Range Size	Endemism	Population Concentration	Threats
15	10	7.5	10	0	10	10

Special Concern Priority

Currently considered a Bird Species of Special Concern (breeding), Priority 1. Categorized as highest priority by Remsen (1978), and included on CDFG's (1992) unprioritized list.

Breeding Bird Survey Statistics for California

Data inadequate for trend assessment (Sauer et al. 2000).

General Range and Abundance

Currently breeds primarily in the interior of North America from the Canadian and U.S. Prairies patchily south and west through the Intermountain West, reaching its southwestern limit in southern Oregon, northeastern California, and western Nevada (Evans and Knopf 1993, AOU 1998). Populations are divisible into two groups, one breeding and migrating east, the other west, of the continental divide. Additional small non-migratory populations breed irregularly on the central Texas coast, on the northern Gulf coast of Mexico, and, in winter, in north-central Mexico. Winters primarily on the Pacific coast and lowlands from central California and southern Arizona south through Baja California and west Mexico to Nicaragua and from Florida and the Gulf states south through the Gulf coast and central plateau of Mexico to the northern Yucatan Peninsula. Generally winters where minimum January ambient temperature is >40º F; highest densities where minimum January temperature is >45º F and average minimum winter temperature is >50º F (Root 1988). Exceptional concentrations of fish in waters shrunk by drought may entice large numbers of pelicans to winter as far north as the Great Basin of western Nevada (Keith and O'Neill 2000).

Post-breeding individuals of western populations may disperse widely (many north and east) before migrating south (Yates 1999, Keith and O'Neill 2000).

Continental populations showed a long-term decline thorough the 1960s but increased through the 1980s (Evans and Knopf 1993, Johnsgard 1993). Johnsgard (1993) estimated the total North American breeding population to be about 109,090 adults at 55 colonies in 1979-1981.

Seasonal Status in California

Occurs year round but seasonal status varies by region. Birds at or in vicinity of high elevation breeding colonies primarily from March-October and on coastal (Bodega Bay southward), Central Valley, and southern desert wintering areas (especially the Salton Sea) primarily from July-January. Also occurs widely during migration, and may summer, or disperse to, nearly anywhere in the normal migrant and winter ranges.

Historical Range and Abundance in California

White pelicans formerly nested widely but locally in lakes and marshes of the Klamath Basin, Modoc Plateau, and Great Basin desert of northeastern California, in overflow lands of the Sacramento Valley, terminal lakes in the Tulare Basin of the San Joaquin Valley, and at the Salton Sea (since early 1900s) in the Colorado desert. Sites of documented former nesting include Tule Lake (up to at least 1899, Bailey 1902) and Goose Lake (prior to 1879; 1976-1977, Winkler 1982), Modoc County; Eagle Lake (up to 1932), Lassen County; the lower Sacramento Valley (up to at least 1910); Tulare Lake (up to at least 1942, W. B. Minturn field notes), Kings County; Buena Vista Lake (up to 1953, AFN 8:41), Kern County; and the Salton Sea (up to 1957, AFN 11:429), Imperial County (Thompson 1933, Grinnell and Miller 1944, references above). It is unclear whether accounts of pelicans nesting at Lower Klamath Lake (up to at least 1915) all pertain to the Oregon, versus California, portion as suggested by the lack of reference to this site by Grinnell and Miller (1944). Although Thompson (1933) suggested Kern Lake, Kern County, and Lake Elsinore, Riverside County, were former nesting sites, Grinnell and Miller (1944) did not consider these

documented breeding locales.

The anecdotal nature of most nesting reports makes it nearly impossible to accurately characterize the abundance of breeding pelicans in California in the late 1800s and early 1900s. Still it is clear that during this period at least thousands of pelicans bred at Lower Klamath Lake, Clear Lake, Tule Lake, the lower Sacramento Valley, Tulare Lake, and the Salton Sea and lesser numbers at Eagle Lake and Buena Vista Lake; almost nothing is known of the size of the Goose Lake colony (Neale 1932, Thompson 1933; WFVZ egg set data, W.B. Minturn field notes [Tulare Lake]). Since the 1930s, refuge biologists have estimated numbers of nests and fledged young at the colonies at Clear Lake NWR and Sheepy Lake, Lower Klamath NWR (Klamath Basin refuge files). Variation in the methods and timing of counts, though, make them difficult to interpret. Numbers of nests at Clear Lake ranged from about 1000-3000 in the 1930s to early 1940s; the only nest count at Lower Klamath during this period was 200 in 1941.

Although shooting out of fear of competition for fish, for sport, and for plumes for the millinery trade caused population reductions the late 1800s and early 1900s, the primary cause of declines was the loss of habitat from water diversions and land reclamation for agriculture (Thompson 1933).

Recent Range and Abundance in California

Since the late 1950s, California's nesting pelicans have been confined mainly to the Klamath Basin, where they currently breed regularly only at Sheepy Lake, Lower Klamath NWR (since at least 1941, refuge files), Siskiyou County, and Clear Lake NWR, Modoc County (since at least 1918, WFVZ egg set data). Since the 1950s, numbers of breeding pelicans in the Klamath Basin seem to have decreased and have varied considerably from year to year (Klamath Basin refuge files). Most nests counts at Clear Lake have ranged from 400-1600 and at Sheepy Lake from 200-700. In four years since the early 1970s, nest counts at Clear Lake have reached 2300-2500. These high counts may reflect especially favorable nesting conditions or they may largely be an

artifact of the methods used, as accurate counts from aerial photos produced the high counts in 1971, 1997, and 1999.

Pelicans also have nested sporadically at Meiss Lake, Butte Valley WA (12-15 nests, 1999-2000; refuge files), Siskiyou County, and Hartson Reservoir, Honey Lake WA (1976, 200-700+ nests, Tait et al. 1978; 1990, 7000 adults, 132 eggs, J. R. Jehl, Jr. in refuge files), Lassen County.

Ecological Requirements

White pelicans are limited by the availability of remote nesting sites and rich foraging habitats. Although adapted to exploit shifting nesting and foraging sites, in response to cycles of drought and flood, pelicans form the largest colonies where these resources are most predictable and islands are subject to minimal disturbance by humans or ground predators (Evans and Knopf 1993). Pelicans often breed in multi-species assemblages of colonial nesters, generally choosing sites on flats or moderate slopes, for flight access and visibility, and avoiding low lying areas prone to flooding; island substrate is usually loose earth suitable for heaping into nest mounds (Palmer 1962, Evans and Knopf 1993). Known nesting situations in California have been on the ground on earthern, sandy, and rocky islands or (rarely) peninsulas and (locally) on floating tule-mat islands, particularly in the Klamath Basin; nests range from being in the open in the sand to being interspersed with or adjacent to tall weeds and open, low-stature shrubs (Thompson 1933, Smith et al. 1984, Klamath Basin refuge files, D. Shuford pers. obs.). Breeding islands are commonly 50-100 km from foraging areas.

White pelicans typically forage, often cooperatively in flocks, in shallow inland waters (0.3-2.5 m deep), such as open areas in marshes and along lake or river edges; wintering and non-breeding birds also feed in shallow coastal marine habitats (Palmer 1962, Evans and Knopf 1993, Johnsgard 1993). Fish spawning in shallow water and those concentrated or stranded by dropping water levels appear to be particularly vulnerable to pelican predation (Knopf and Kennedy 1980).

Pelicans nesting at Lower Klamath and Clear Lake forage extensively in the Klamath Basin

in lakes, marshes, canals, and reservoirs within 100+ km of nesting islands (Smith et al. 1984, L. A. Moreno-Matiella unpubl. data, D. Anderson in litt.). Although not attributable to colony of origin, foraging pelicans also are found widely over southeastern Oregon and northeastern California (Smith et al. 1984). Pelican populations may shift their primary foraging sites at least two to three times during the nesting season as they opportunistically select sites where fish are most readily available (Knopf and Kennedy 1980). Radiotelemetry studies indicate that roundtrips for foraging of >322 km (200 mi) are common; breeding birds in western Nevada make repeated flights over the Sierra Nevada to forage in California's Central Valley (Yates 1999).

The diet of these pelicans is mainly "rough" fish of low economic value – predominately small (<½ bill length) schooling fish but also larger sluggish bottom feeders – as well as salamanders and crayfish (Palmer 1962, Smith et al. 1984, Evans and Knopf 1993, Johnsgard 1993).

Threats

Historically, white pelicans were impacted primarily by the loss of foraging and nesting habitat and by human disturbance, factors still of concern today. Given the water and recreational demands of the state's rapidly expanding human population, it is unlikely that restoration efforts will enable pelicans to establish many new colonies or reoccupy much of their historic breeding range. The extreme concentration of the state's breeding population leaves it vulnerable to catastrophic losses, particularly at the Clear Lake colony. Both Klamath colonies are remote but not immune to human disturbance on an irregular basis (refuge files), ground predators during drought years (refuge files), or rapid transmission of disease at any time. Boellstorff et al. (1988) reported that research activities lowered reproductive success of a disturbed colony at Lower Klamath.

The availability of high quality water for remaining wetlands is increasingly of concern to Klamath Basin pelicans (D. Mauser pers. comm.). A Solicitor General's opinion in 1995 lowered the refuges' priority for water, placing them last on the list after endangered species, tribal trust, and agriculture. This change is predicted to have severe impacts at Lower Klamath NWR (USBR

1998), particularly during summer and fall (D. Mauser pers. comm.). Fortunately the important pelican forage grounds at Tule Lake will retain some priority for summer water for remnant populations of the endangered Lost River sucker *(Deltistes luxatus)* and shortnose sucker *(Chasmistes brevirostris)*. The refuges, particularly Tule Lake, also suffer from poor water quality via hyper-eutrophication from excess input of nutrients from agricultural runoff.

The Sheepy Lake colony is at risk from fluctuating water levels, which need to be maintained within a narrow range. Water levels kept too high in 1999 and 2000 saturated the tule-mat nesting islands and no pelicans nested (D. Mauser pers. comm.).

White pelicans in the Klamath Basin were susceptible to direct mortality and eggshell thinning from organochlorine pesticide contamination from the 1960s to mid-1980s (Keith 1966, Godsil and Johnson 1968, Boellstorff et al. 1985). Although pelicans initially were exposed to organochlorine pesticides in the Klamath Basin, by 1981 their exposure there was minimal; hence, birds probably accumulated these chemicals on the wintering grounds or migration routes in spring. Currently contamination is not a problem for Klamath Basin pelicans (D. Anderson in litt.).

White pelicans also are subject to catastrophic losses where large numbers congregate during migration or winter. They are particularly vulnerable at the Salton Sea and Río Colorado Delta, as most of the western population passes through this area in the non-breeding season (D. Anderson in litt.). High counts of white pelicans at the Salton Sea in the 1980s and 1990s ranged from about 25,000 to 33,000 (Shuford et al. in press), and nearly 9000 (10-15% of the western population) died in an avian botulism disease outbreak there in 1996 (Rocke and Friend in press). At least some pelicans from the Clear Lake and Lower Klamath breeding colonies have been detected at the Salton Sea during their southward migration (D. Anderson pers. comm.).

Pelicans from the western population also are shot where they consume fish at aquaculture operations in Mexico (D. Anderson in litt.).

Management and Research Recommendations

The USFWS's (1984) management recommendations for the western population are modified here for California:

- Provide or maintain nesting islands of suitable size, substrate, and isolation. Manage water levels to avoid flooding or connecting islands to the mainland, and, if necessary, prevent erosion by planting vegetation or installing riprap or porous cement pads. When peninsulas form at Clear Lake during drought, continue to erect temporary electric fences to deter ground predators from entering colonies, as was done in the past (Klamath refuge files).
- Maintain or enhance nongame fish populations for pelicans, restoring prey species at pelican foraging areas as necessary. Ensure availability of prey by maintaining shallow (1-2 m) water levels and, when feasible, drawing down levels to provide foraging opportunities.
- Minimize human disturbance at colonies by restricting access by land or boat (posting and patrolling nesting areas), prohibiting discharge of firearms nearby, and requiring aircraft to stay at least 610 m (2000 ft) from nesting islands. Carefully review all research protocols to evaluate whether expected results are worth the risks of disturbance. Researchers should avoid or minimize disturbance to nesting pelicans by entering colonies only when absolutely necessary; colonies are particularly vulnerable when eggs or small young are present, which may occur even late in the season because of sub-colony asynchrony.
- Establish a taskforce to evaluate the feasibility and methods of restoring former nesting sites or developing new ones. Consider whether natural pioneering will be sufficient at restored or enhanced sites or if placement of pelican decoys, playing taped vocalizations, or transplanting of young (restocking) might be needed. Assess the benefits of new nesting islands to other colonial nesters and the potential for any unintended impacts to other wildlife populations. Present these findings to partners active in wetland conservation.

- Educate the public about the history of population declines, pelican ecology, and the effects of human disturbance.
- Conduct a population viability analysis to see which population parameters contribute the most to limitation of the Klamath breeding population.
- Initiate detailed studies of the foraging ecology of Klamath Basin pelicans to assess how they might be impacted by water quality or water allocation priorities in any year. Conduct diet studies of pelicans in the Klamath Basin and study the ecology of important fish species. Also, study pelican foraging ecology on the wintering grounds.
- Conduct typical and satellite telemetry studies to determine foraging movements, dispersal patterns, and migration routes of Klamath pelicans to assess risks at foraging areas in both the breeding and non-breeding seasons.
- Periodically evaluate pesticides and contaminants in pelicans. Continue disease reduction efforts at the Salton Sea and study disease events there or elsewhere where pelicans concentrate in the non-breeding season.

Monitoring Needs

Numbers of breeding pairs should be monitored by nest counts from aerial photographs taken annually at known colonies during the peak of the incubation period (early May in Klamath Basin). See Smith et al. (1984) and Shuford (1998) for methods used recently in the Klamath Basin. Reproductive success also should be monitored annually via early July counts of the number of young reaching fledging age.

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